Table 1. Summary of hypotheses, corresponding specific predictions, and results. We count predictions as fully supported ('yes') when the response is signficant in single-variable tests (Table 4) and included in all top full models and as partially supported ('(yes)') or rejected ('(no)') when the direction of response consistently matched the prediction but the effect was not significant in all models.

	Prediction supported?				
Hypotheses & Specific Predictions	Overall	1966	1977	1999	Results
Tree size and microenvironment					
Larger, taller trees have lower Rt.					
Rt decreases with stem diameter (DBH).	yes	yes	-	-	Table 4
Rt decreases with height (H).	yes	yes	-	(yes)	Tables 4, 5
Trees with more exposed crowns have lower Rt.					
Dominant trees have lowest Rt.	-	yes	(yes)	-	Tables 4, 5
Correcting for H, dominant trees have lowest Rt.	(no)		-	(no)	Tables 4, 5
Small trees (lower root volume) in drier microhabitats have lower Rt.					
There is a negative interactive effect between H and topographic wetness index.	-	-	-	-	Table 4
Species traits					
Species' traits–particularly leaf hydraulic traits–predict Rt.					
Wood density correlates (positively or negatively) to Rt.	-	-	-	-	Table 4
Leaf mass per area correlates positively to Rt.	-	-	-	-	Table 4
Ring-porous species have higher Rt than diffuse- or semi-ring- porous.	-	yes	(no)	yes	Tables 4, 5
Percent loss leaf area upon desiccation correlates negatively with Rt.	yes	yes	(yes)	-	Tables 4, 5
Water potential at turgor loss correlates negatively with Rt.	(yes)	-	(yes)	(yes)	Tables 4, 5

Table 2. Summary of variables.

variable	symbol	units	description	category	n
Dependent variable					
drought resistance	Rt	-	ratio of growth during drought year to mean growth of the 5 years prior.	-	1596
Independent variables					
drought year	Y	-	year of drought	1966	478
				1977	547
				1999	571
tree size					
diameter breast height	DBH	cm	DBH in drought year	-	all
height	H	m	estimated H in drought year	-	all
microhabitat					
crown position		-	2018 crown position	dominant (D)	31
				co-dominant (C)	231
				intermediate (I)	224
				suppressed (S)	101
topographic wetness index	TWI	-	steady-state wetness index based on slope and upstream contributing area	-	all
species' traits					
wood density	WD	g cm^{-3}	dry mass of a unit volume of fresh wood	-	all
leaf mass per area	LMA	kg m^{-2}	ratio of leaf dry mass to fresh leaf area	-	all
xylem porosity		-	vessel arrangement in xylem	ring (R)	408
				semi-ring (SR)	31
				diffuse (D)	178
turgor loss point	π_{tlp}	MPa	water potential at which leaves wilt	-	all
percent loss area	PLA_{dry}	%	percent loss of leaf area upon dessication	-	all

Table 3. Overview of analyzed species, listed in order of their relative contributions to woody stem productivity ($ANPP_{stem}$) in the plot, along with numbers and sizes sampled, and species traits. Variable abbreviations are as in Table 2.

			DBH (cm)		species traits (mean +/- sd)				
species	$\% ANPP_{stem}$	n cores	mean	range	WD ($g\,cm^{-3}$)	LMA ($g\,cm^{-2}$)	xylem porosity	π_{tlp} (Mpa)	PLA (%)
Liriodendron tulipifera (LITU)	47.1	98	368.54	100 - 1004	0.4 ± 0.03	46.92 ± 12.38	diffuse	-1.92 ± 0.17	19.56 ± 2.06
Quercus alba (QUAL)	10.7	61	471.51	114 - 791	0.61 ± 0.02	75.8 ± 11.05	ring	-2.58 ± 0.08	8.52 ± 0.37
Quercus rubra (QURU)	10.1	69	548.79	110.7 - 1480	0.62 ± 0.02	71.13 ± 6.70	ring	-2.64 ± 0.28	11.01 ± 0.84
Quercus velutina (QUVE)	7.8	77	541.38	160.2 - 1142	0.65 ± 0.04	48.69 ± 3.30	ring	-2.39 ± 0.15	13.42 ± 0.84
Quercus montana (QUPR)	4.8	59	422.48	105 - 872	0.61 ± 0.01	71.77 ± 40.17	ring	-2.36 ± 0.09	11.75 ± 1.37
Fraxinus americana (FRAM)	3.8	62	353.63	64 - 947.3	0.56 ± 0.01	43.28 ± 4.78	ring	-2.1 ± 0.36	13.06 ± 1.06
Carya glabra (CAGL)	3.7	31	313.89	98 - 985	0.62 ± 0.04	42.76 ± 0.94	ring	-2.13 ± 0.50	21.09 ± 5.48
Juglans nigra (JUNI)	2.1	31	481.42	242 - 870	1.09 ± 0.09	72.13 ± 7.10	semi-ring*	-2.76 ± 0.21	24.64 ± 8.72
Carya cordiformis (CACO)	2.0	13	271.87	107 - 615	0.83 ± 0.10	45.86 ± 15.60	ring	-2.13 ± 0.45	17.22 ± 2.25
Carya tomentosa (CATO)	2.0	13	209.74	121 - 322.1	0.83	45.36	ring	-2.2	16.56
Fagus grandifolia (FAGR)	1.5	80	235.11	112 - 1072	0.62 ± 0.03	30.68 ± 4.94	diffuse	-2.57	9.45 ± 1.25
Carya ovalis (CAOVL)	1.1	23	352.87	149 - 660	0.96 ± 0.33	47.6 ± 3.95	ring	-2.48 ± 0.04	14.8 ± 6.34

* Semi-ring porosity is intermediate between ring and diffuse. We group it with diffuse-porous species for more even division of species between categories.

Table 4. Single-variable tests of hypothesized drivers of drought resistance. Models including each variable were compared to corresponding null models. dAIC is the AICc of the null model minus that of the model including the variable (thus, dAICc>2 indicates that the variable significantly improves the model). Variable abbreviations are as in Table 2.

			all droughts		1966		1977		1999	
ï»¿variable	category	null model variables	dAICc	coefficients	dAICc	coefficients	dAICc	coefficients	dAICc	coefficients
Tree size and microenvironment										
ln[DBH]		(year)	142.69**	-319.54	86.06**	-270.50	62.23**	-349.90	43.02**	-309.68
ln[H]		(year)	143.58**	-497.72	86.06**	-421.34	62.23**	-545.00	43.02**	-482.37
crown position	D	(year)	111.59**	-155.39	44.95**	-97.19	42.68**	-270.73	28.29**	-113.35
(alone)	C		-	0.00	-	0.00	-	0.00	-	0.00
	I		-	238.08	-	215.90	-	250.29	-	245.31
	S		-	381.06	-	300.28	-	443.13	-	394.95
crown position	D	ln[H] (+year)	30.11**	-103.97	-2.65	-49.82	-0.16	-218.22	-3.047	-67.15
(with height)	C		-	0.00	-	0.00	-	0.00	-	0.00
	I		-	78.47	-	61.81	-	78.23	-	106.65
	S		-	80.49	-	10.81	-	126.02	-	127.59
ln[TWI]		ln[H] (+year)	8.67**	41.07	-1.85	34.48	-1.57	-80.59	-0.34	154.87
ln[TWI]*ln[H]		ln[H]+ln[TWI] (+year)	10.31**	100.63	-1.84	73.89	-1.86	-108.96	-1.25	250.70
Species traits										
WD		ln[H] (+year)	12.74**	335.22	-1.75	102.45	0.66	433.90	-0.2	514.17
LMA		ln[H] (+year)	4.29**	4.50	-0.4	2.95	1.49*	5.90	-1.18	4.46
xylem porosity	R	ln[H] (+year)	13.87**	206.92	4.22**	175.53	-1.28	93.88	5.35**	384.25
	D/SR		-	0.00	-	0.00	-	0.00	-	0.00
π_{tlp}		ln[H] (+year)	13.48**	-309.50	-1.67	-82.16	5.62**	-458.78	0.1	-397.14
PLA		ln[H] (+year)	4.73**	-6.15	-1.42	-5.62	-2.01	-1.82	-1.22	-13.26

*dAICc > 1: variable qualified for inclusion in full model

**dAICc > 2: statistically signficant, variable qualified for inclusion in full model

Table 5. Summary of top full models for each drought instance. Models are ranked by AICc, and we show all models whose AICc value falls within 1.0 (dAICc<1) of the best model (bold).

					crown position					xylem porosity			
rank	dAICc	R^2	Intercept	$ln[H]$	D	C	I	S	$ln[TWI]$	D/SR	R	PLA	π_{tlp}
all	**0.000**	**0.26**	**-172.496**	**-437.576**	**-114.18**	**0**	**75.375**	**81.801**	**-**	**0**	**254.89**	**7.592**	**-400.824**
	0.219	0.26	102.739	-429.938	-116.874	0	73.419	80.228	-	0	224.41	-	-283.102
	0.872	0.26	50.476	-427.437	-115.784	0	75.642	81.977	-	0	223.001	-	-349.726
	0.987	0.26	-219.772	-432.196	-114.419	0	74.843	83.099	-	0	264.534	8.191	-428.38
1966	**0.000**	**0.21**	**964.614**	**-433.719**	**-**	**-**	**-**	**-**	**-**	**0**	**170.641**	**-**	**-**
1977	**0.000**	**0.17**	**-144.835**	**-570.765**	**-**	**-**	**-**	**-**	**-**	**0**	**153.211**	**12.317**	**-536.952**
	0.328	0.19	-244.432	-410.426	-214.825	0	90.001	154.936	-	-	-	-	-477.771
	0.515	0.18	-564.245	-448.260	-207.627	0	81.502	142.912	-	0	133.71	11.461	-553.111
	0.666	0.17	15.204	-565.876	-	-	-	-	-103.548	0	149.387	12.703	-539.966
	0.704	**0.17**	**-544.811**	**-582.372**	**-**	**-**	**-**	**-**	**-**	**0**	**197.001**	**22.459**	**-751.303**
	0.778	0.18	223.202	-555.643	-	-	-	-	-	0	105.02	-	-451.305
	0.813	0.19	-230.630	-432.149	-213.248	0	82.758	145.288	-	0	88.493	-	-474.612
	0.991	0.18	249.576	-540.066	-	-	-	-	-	-	-	-	-452.02
1999	0.000	0.20	-300.043	-512.811	-	-	-	-	177.904	0	411.456	-	-456.075
	0.204	0.21	-298.821	-500.550	-	-	-	-	166.576	0	437.501	-	-437.919
	0.442	0.21	-392.023	-500.279	-	-	-	-	176.925	0	441.736	-	-545.551
	0.465	0.20	13.786	-505.228	-	-	-	-	-	0	402.301	-	-450.637
	0.476	0.20	-206.735	-512.631	-	-	-	-	166.683	0	409.333	-	-347.115
	0.595	0.21	-723.413	-504.772	-	-	-	-	171.093	0	491.951	10.564	-635.552
	0.599	0.20	98.028	-505.653	-	-	-	-	-	0	400.721	-	-325.284
	0.641	0.21	5.687	-494.050	-	-	-	-	-	0	428.36	-	-416.705

Figure Legends

Figure 1. Climate and species-level growth responses over our study period, highlighting the three focal drougths (a) and community-wide responses Time series plot (**a**) shows peak growing season (May-August) climate conditions and residual chronologies for each species. PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (**b**) show the distribution of resistance values for each drought.

Figure 2. Height profiles in growing season climatic conditions, tree heights by crown position, and leaf hydraulic traits Shown are averages (± SD) of daily maxima and minima of (**a**) wind speed, (**b**) relative humidity (RH), and (**c**) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (**d**) 2018 tree heights by canopy position (see Table 2 for codes). In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.

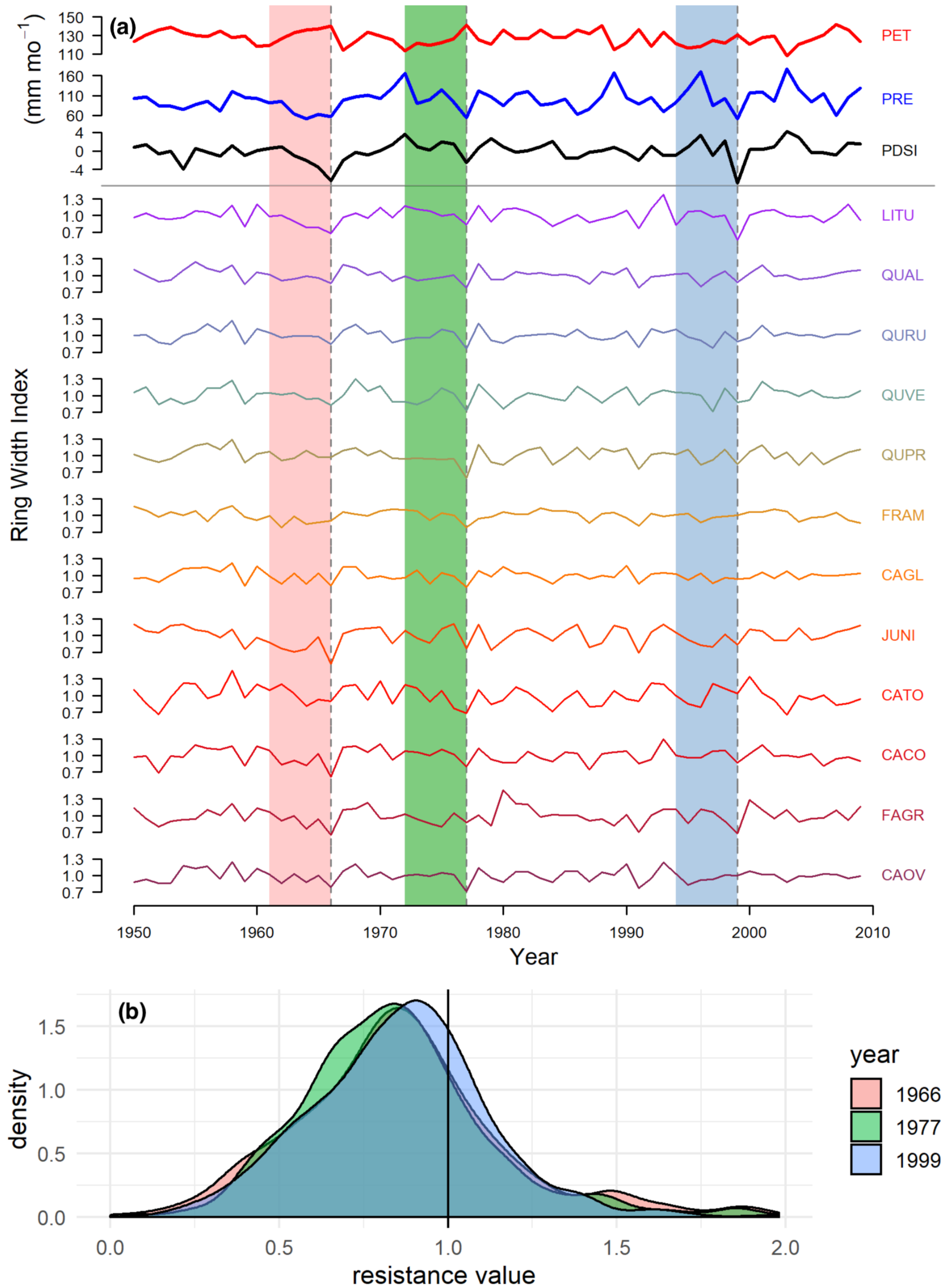

Figure 1. Climate and species-level growth responses over our study period, highlighting the three focal drougths (a) and community-wide responses Time series plot (a) shows peak growing season (May-August) climate conditions and residual chronologies for each species. PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (b) show the distribution of resistance values for each drought.

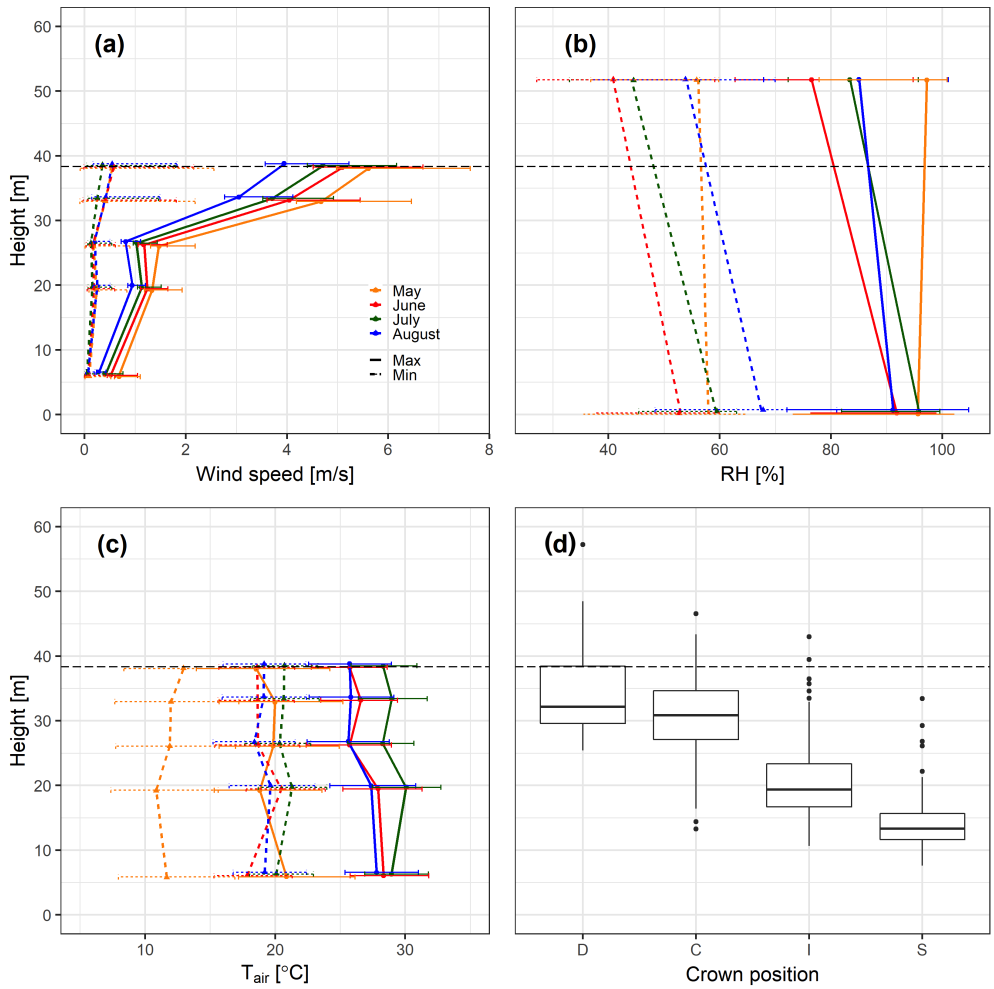

Figure 2. Height profiles in growing season climatic conditions, tree heights by crown position, and leaf hydraulic traits The top row shows averages (± SD) of daily maxima and minima of (a) wind speed, (b) relative humidity (RH), and (c) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (d) 2018 tree heights by canopy position (see Table 2 for codes). In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.